Please make the corrections to all of the independent claims as indicated below.

Thank you
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Pending Claims:

1 (Currently Amended) A strongly-ionized plasma generator comprising:

a) a chamber for confining a feed gas;

b) an anode that is positioned inside the chamber;

c) a cathode assembly that is positioned adjacent to the anode inside the chamber; and

d) a pulsed power supply having an output that is electrically connected between the anode and the cathode assembly, the pulsed power supply generating at the output a multi-stage voltage pulse having at least one of a controlled amplitude and a controlled rise time that prevents forming an arc between the anode and the cathode assembly, the multi-stage voltage pulse comprising: a low-power stage including a first peak voltage having a magnitude and a rise time that is sufficient to generate a weakly-ionized plasma from the feed gas; and a transient stage including a second peak voltage having a magnitude and a rise time that is sufficient to shift an electron energy distribution in the weakly-ionized plasma to higher energies that increase an ionization rate which results in a rapid increase in electron density and a formation of a strongly-ionized plasma.

2 (Original) The plasma generator of claim 1 further comprising a magnet that generates a magnetic field proximate to the cathode assembly.

3 (Original) The plasma generator of claim 2 wherein the magnet is movable.

4 (Original) The plasma generator of claim 2 wherein the magnetic field generated by the magnet confines the weakly-ionized and strongly ionized plasmas proximate to the cathode assembly.

5 (Original) The plasma generator of claim 2 wherein the magnetic field generated by the magnet and an electric field generated by the multi-stage voltage pulse induces an electron Hall current that raises the temperature of the electrons in the weakly-ionized plasma to a temperature that enhances the rapid increase in electron density and the formation of the strongly-ionized plasma.

6 (Original) The plasma generator of claim 1 wherein the feed gas comprises at least one of excited and metastable atoms.

7 (Original) The plasma generator of claim 1 wherein the magnitude of the first peak voltage is less than 1,000V.

8 (Original) The plasma generator of claim 1 wherein the pulsed power supply provides enough energy for the electron energy distribution in the weakly-ionized plasma to continuously shift to higher energies until the strongly ionized plasma is formed.

9 (Original) The plasma generator of claim 1 further comprising an energy storage device that is electrically coupled to the cathode assembly, the energy storage device discharging energy into the weakly-ionized plasma to enhance the rapid increase in electron density and the formation of the strongly-ionized plasma.

10 (Original) The plasma generator of claim 1 wherein the weakly-ionized plasma has a discharge current density that is less than about $0.5A/cm^2$ and a power density that is less than about $250W/cm^2$.

11 (Original) The plasma generator of claim 1 wherein the pulsed power supply generates the transient stage of the multi-stage pulse at a time that is at least 150μsec after the generation of the weakly-ionized plasma.

12 (Original) The plasma generator of claim 1 wherein the rise time of the second peak voltage in the transient stage is greater than about 0.5V/μsec.

13 (Original) The plasma generator of claim 1 wherein the magnitude of the second peak voltage is less than about 1,000V over the first peak voltage.

14 (Original) The plasma generator of claim 1 wherein the second peak voltage in the transient stage forms ionizational instabilities in the weakly-ionized plasma.

15 (Original) The plasma generator of claim 1 wherein the transient stage generates diocotron oscillations in the weakly-ionized plasma.

16 (Original) The plasma generator of claim 1 wherein a discharge current density of the strongly-ionized plasma is greater than about $0.5A/cm^2$.

17 (Original) The plasma generator of claim 1 wherein the power density of the strongly-ionized plasma is greater than $250W/cm^2$.

18 (Original) The plasma generator of claim 1 wherein the multi-stage voltage pulse further comprises a high-power stage following the transient stage, the high-power stage having a voltage that is sufficient to sustain the strongly-ionized plasma.

19 (Original) The plasma generator of claim 18 wherein the voltage in the high-power stage comprises a relatively constant average voltage.

20 (Original) The plasma generator of claim 18 wherein a lifetime of the strongly-ionized plasma is greater than about 200μsec.

21 (Currently Amended) A method of generating a strongly-ionized plasma, the method comprising:

a) supplying feed gas proximate to an anode and a cathode assembly;

b) generating a weakly-ionized plasma by applying a first voltage between the anode and the cathode assembly, the first voltage having at least one of a controlled amplitude and a controlled rise time that prevents forming an arc between the anode and the cathode assembly, the [a] magnitude and [a] the rise time of the first voltage being [that is] sufficient to ignite the feed gas; and

c) generating a strongly-ionized plasma from the weakly-ionized plasma by applying a second voltage between the anode and the cathode assembly, the second voltage having [a] at least one of a controlled amplitude and a controlled rise time that prevents forming an arc between the anode and the cathode **assembly**, the magnitude and [a] the rise time ~~that is~~ of the second voltage being sufficient to shift an electron energy distribution in the weakly-ionized plasma to higher

energies that increase an ionization rate which results in a rapid increase in electron density and a formation of the strongly-ionized plasma.

22 (Original) The method of claim 21 further comprising applying a magnetic field proximate to the cathode assembly.

23 (Original) The method of claim 22 further comprising moving the magnetic field.

24 (Original) The method of claim 22 further comprising generating an electron Hall current from an electric field generated by the second voltage and from the magnetic field, the electron Hall current raising the temperature of the electrons in the weakly-ionized plasma to a temperature that enhances the increase in electron density and the formation of the strongly-ionized plasma

25 (Original) The method of claim 21 wherein the first and the second voltages comprise a multi-stage voltage pulse.

26 (Original) The method of claim 21 further comprising applying a third voltage between the anode and the cathode assembly that sustains the strongly-ionized plasma.

27 (Original) The method of claim 26 wherein an average value of the third voltage applied between the anode and the cathode assembly is relatively constant.

28 (Original) The method of claim 21 wherein a lifetime of the strongly-ionized plasma is greater than 200μsec.

29 (Original) The method of claim 21 wherein the weakly-ionized plasma is in a steady state condition before the application of the second voltage.

30 (Original) The method of claim 21 wherein the weakly-ionized plasma is in a quasi-steady state condition before the application of the second voltage.

31 (Original) The method of claim 21 further comprising discharging energy from an energy storage device into the weakly-ionized plasma to enhance the rapid increase in electron density and the formation of a strongly-ionized plasma.

32 (Original) The method of claim 21 wherein the magnitude and the rise time of the second voltage are sufficient to generate ionizational instabilities in the weakly-ionized plasma that enhance the ionization rate resulting in a rapid increase in electron density and the formation of the strongly-ionized plasma.

33 (Original) The method of claim 32 wherein the ionizational instabilities comprise diocotron instabilities.

34 (Original) The method of claim 21 wherein the magnitude of the first voltage is less than 1,000V.

35 (Original) The method of claim 21 wherein the rise time of the second voltage applied between the anode and the cathode assembly is greater than about 0.5V/μsec.

36 (Original) The method of claim 21 wherein the magnitude of the second voltage is less than about 1,000V over the first voltage.

37 (Original) The method of claim 21 wherein the weakly-ionized plasma has a discharge current density that is less than about 0.5A/cm^2 and a power density that is less than about 250W/cm^2.

38 (Currently Amended) A method of generating a strongly-ionized plasma, the method comprising:

a) supplying feed gas proximate to an anode and a cathode assembly; and

b) applying a voltage pulse between the anode and the cathode assembly with at least one of a controlled amplitude and a controlled rise time that prevents forming an arc between the anode and the cathode assembly, the voltage pulse comprising: a first peak voltage having a magnitude and a rise time that is sufficient to ignite ~~an initial~~ a weakly-ionized plasma from the feed gas; and a second peak voltage having a magnitude and a rise time that is sufficient to shift an electron energy distribution in ~~the initial~~ the weakly-ionized plasma to higher energies that increase an ionization rate resulting in a rapid increase in electron density and a formation of the strongly-ionized plasma ~~that is sustained for greater than 200μsec~~.

39 (Original) The method of claim 38 further comprising applying a magnetic field proximate to the cathode assembly.

40 (Original) The method of claim 39 further comprising moving the magnetic field.

41 (Original) The method of claim 39 further comprising generating an electron Hall current from an electric field generated by the voltage pulse and from the magnetic field, the electron Hall current raising the temperature of the electrons in the initial plasma to a temperature that enhances the rapid increase in electron density and the formation of the strongly-ionized plasma.

42 (Original) The method of claim 38 wherein the voltage pulse further comprises a substantially constant voltage that sustains the strongly-ionized plasma.

43 (Original) The method of claim 38 wherein a duration of the voltage pulse is greater than 200μsec.

44 (Original) The method of claim 38 wherein the magnitude of the first peak voltage is less than 1,000V.

45 (Original) The method of claim 38 wherein the magnitude of the second peak voltage is less than about 1,000V over the first peak voltage.

46 (Original) The method of claim 38 wherein the second peak voltage has a magnitude and a rise time that are sufficient to generate ionizational instabilities that enhance the ionization rate resulting in the rapid increase in electron density and the formation of the strongly-ionized plasma.

47 (Currently Amended) An apparatus for generating a strongly-ionized plasma, the apparatus comprising:

a) means for supplying feed gas proximate to an anode and a cathode assembly;

b) means for generating a weakly-ionized plasma from the feed gas;

c) means for shifting an electron energy distribution in the weakly-ionized plasma to higher energies by controlling at least one of an amplitude and a rise time of a voltage applied between the anode and the cathode assembly to prevent forming an arc between the anode and the cathode assembly, ~~that~~ the voltage ~~increase~~

increasing an ionization rate which results in a rapid increase in electron density and a formation of the strongly-ionized plasma from the weakly-ionized plasma; and

d) means for sustaining the strongly-ionized plasma for greater than 200μsec.